

Running Head: IMPROVING PATIENT THROUGHPUT

Improving Patient Throughput in the Winn Army Community Hospital Department of

Emergency Medicine

Fort Stewart, Georgia

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ABSTRACT

The Military Health System (MHS) finds itself operating in a competitive market. TRICARE, the military managed care system, allows family members to seek care outside the uniformed network. In this competitive environment, it is necessary to deliver healthcare in such a way that meets or exceeds patients' expectations and perceptions. Doing so not only ensures the existence of a robust MHS, but it is simply the right thing to do. As such, the staff at Winn Army Community Hospital (WACH) takes patient satisfaction very seriously.

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INTRODUCTION

Improving patient throughput in both military and private Departments of Emergency Medicine (DEM) is one of the most popular topics in emergency medicine. The reasons for stressing faster throughput vary. Clinically, physicians want to move patients as quickly as possible through a DEM. The sooner a physician can see a patient from the waiting room, the less likely it is that a patient's condition will deteriorate. From the patient's perspective, the sooner he or she can see a physician, the better. For many patients, "quality is measured by the amount of time they spend in the emergency room" (Jones, 1996, p. 31). Not surprisingly, "patient dissatisfaction with [DEM] care often centers on long waiting times" (Ellis & Brandt, 1997, p. 229). Most healthcare professionals associate quality, from the patient's perspective, with fewer complaints, less litigation, more compliments, and a continued relationship with a valued customer. Therefore, if patients measure quality as a function of time, one might apply customer satisfaction as a measurement of good, or poor, throughput in any DEM.

Patient satisfaction is a decisive factor in determining the Military Health System's (MHS's) competitiveness (Joseph, 1995). Given the Department of Defense (DoD) managed care program, TRICARE, some military beneficiaries can now seek care outside the military hospital. The TRICARE option allows choice, by combining the medical resources of each of the military services with the private healthcare industry. Therefore, medical facility commanders are becoming increasingly concerned with meeting and exceeding their patients' perceptions.

Previously, military beneficiaries either sought care exclusively from a military treatment facility or through the Civilian Health and Medical Program of the Uniformed

Services (CHAMPUS). The CHAMPUS program resembled a traditional fee-for-service option, and soon contributed to exorbitant healthcare spending in the military. In response to the rising costs of healthcare and a budget-conscious congress, the DoD began implementing TRICARE on October 1st, 1993 (Rivera, 1996).

One of the striking similarities between TRICARE and private managed care organizations (MCO) is their need to enroll members for fiscal survival. Theoretically, the fewer patients a private MCO treats as total enrollment increases, the more it stands to profit. Similarly, most military medical facilities are preparing for enrollment-based capitation (EBC). Under EBC, a MTF's budget depends on the number of Prime beneficiaries enrolled to that MTF. Prime beneficiaries are those that, under TRICARE, choose to seek care exclusively at the MTF. However, due to finite resources, MTFs cannot meet unlimited demands; therefore, contrary to traditional economic tenets, they must cap their enrollment. As a result, Commanders must refer any excess demand to the TRICARE Managed Care Support Contractor "who builds a supply system to meet the demand" (Rivera, 1996, p. 8). Still, when EBC tightens its grip around the MHS, medical facility commanders will be forced to more eloquently "sell" their services as preferable options to private health insurance.

If dissatisfied patients choose to enroll elsewhere (under TRICARE), the MTF suffers an opportunity cost, but not necessarily a decrease in patient visits. This is because MTFs commonly treat non-enrolled (and, therefore, non-funded) family members and retirees on a space-available basis. Dissatisfaction, then, begins the spiraling effect of decreased enrollment followed by under-funding, fewer available services, and more dissatisfied customers.

Line commanders are more sensitive to family's quality of life under today's Total Army concept. If soldiers and family members grow dissatisfied with medical care (rated the number two concern of military families according to the 1996 Customer Service Evaluation System Survey), unit readiness can decline as morale weakens and soldiers spend more time trying to access providers for themselves and their family members. Therefore, MTF commanders must answer not only to medical financiers, but also to their line constituents. The ability to do both simultaneously does not come easily.

Lastly, treating patients quickly and efficiently, while trying to meet most of their expectations, is simply the right thing to do. Regardless of the financial or political pressures changing the delivery of military medicine, healthcare providers should practice good bedside manner, customer service, and medical professionalism. If the customer considers the time to be seen in the DEM important, then the command must respond accordingly. Since most of the patient complaints filed against the Winn Army Community Hospital (WACH) DEM mention the waiting time to see a physician, it follows that the command should find ways to overcome that obstacle to customer satisfaction.

CONDITIONS WHICH PROMPTED THE STUDY

Winn Army Community Hospital exists because of and for the active duty soldier and his or her family members. The commander refers to patients as customers, and requires that his staff make each patient feel special. Patient satisfaction is clearly the focus at WACH, and is the prevailing theme in the corporate culture. Therefore, the hospital has a new mission: to provide the highest quality healthcare to its patients. The Commander's vision is to make Team Winn the most caring healthcare organization in the Army.

In order to reach its vision, the hospital staff uses a continuing process improvement (PI) campaign. Currently, there are at least four active process action teams (PATs) within the facility. One such team exists solely for the Department of Emergency Medicine (DEM), and was chartered to improve the efficiency of patient flow within the emergency department. The executive committee agrees that the DEM, under new leadership for the last year, has improved patient care and flow compared to previous years. Though the DEM does seem to operate more efficiently than one year ago, most of its patient complaints still revolve around waiting times. Therefore, as process improvement implies, the DEM can accelerate patient throughput without sacrificing quality outcomes. The commander and staff believe this, and have therefore set out to find new solutions to an old problem.

STATEMENT OF THE PROBLEM OR QUESTION

The DEM has relatively low patient satisfaction when compared to its military peers, according to the monthly Customer Satisfaction Survey, conducted by the Office of the Assistant Secretary of Defense for Health Affairs (OASD [HA]). The survey is published monthly, and reports weighted averages for the previous three months. Since the survey began in January 1997, the WACH DEM has scored below the average of all other DEMs within the MHS in 16 of 18 periods through October 1998. Though many argue the survey's results are statistically insignificant, locally collected patient complaints repeatedly mention excessive waiting times. In some cases, waits exceed three hours for patients triaged as category I, II, or III (the WACH standard is one hour). Therefore, one might assume that longer waits yield lower satisfaction. For triage category explanations, see Table 1.

Table 1

Department of Emergency Medicine (WACH) Triage Categories

Triage Category	Explanation
I - Emergent	Patients who need immediate medical care to prevent potential loss of life, limb, or eyesight.
II - Urgent Priority	Patients who require prompt care to prevent possible progression to life-threatening conditions, but are not at the risk of loss of life, limb, or eyesight.
III - Urgent Routine	Patients with stable conditions that require timely treatment, but do not have life threatening conditions.
IV - Non-Urgent Priority	Patients with conditions that are stable and require treatment when available and are not at risk of significant worsening should there be a delay in care.
V - Non-Urgent Routine	Patients with conditions that are stable and require treatment when available and are not at risk of significant worsening should there be a <i>significant</i> delay in care.

Note. Non-Urgent category patients are seen only when all patients in the urgent categories have been treated.

The research asks whether or not process changes in the DEM can shorten patients' waits for physicians, and subsequently improve patient satisfaction. Though many articles have tracked patients' total turnaround time (TAT) in a given DEM, few have concentrated on the timeliness of care for the most serious complications. This paper monitors the time from presentation to physician evaluation, and reviews how well the WACH DEM meets the "golden hour" standard for patients with true emergencies.

LITERATURE REVIEW

Process improvement teams, process action teams, and quality circles are common terms for collaborative efforts to identify opportunities, strengths, and weaknesses in a process. The end result should yield a positive difference in some variable that had been directly affected by one or more of a team's efforts. Fernandes, Christenson, and Price (1996) found that a continuous quality improvement (CQI) team reduced the lengths of stay for non-acute patients in an emergency department (ED) by omitting unnecessary or

duplicate tasks and by adding minimal staff. Similarly, Lau and Leung (1997) concluded that their clinical team consultation system could do the same. Though these clinical teams actually treated patients, and were not members of an administrative PAT, the authors' research supports the notion that manipulating some independent variables can significantly affect waiting times.

Laboratories commonly demonstrate a special relationship with DEMs by assigning higher priorities to DEM samples than to those of any other clinic, ward, or service. Not surprisingly, the relationship between the two, though special, is often difficult. Laboratory (Lab) delays are the primary stressors in this relationship. Fernandes, Walker, Price, Marsden, and Haley (1997) report Lab assistant availability, recollection rate, volume of ordered tests, and order processing time as the root causes of lab delays. Similarly, a study by Steindel and Howanitz (1997) implies the time required to draw blood samples also depends on an individual's training and skill. Like many in a DEM staff, the blood drawers and Lab assistants have additional duties such as "answering the phone, paging various medical [and] ancillary services, and processing admissions and discharges" (Fernandes et al., 1997, p. 736). These duties inevitably add to lab specimen TATs.

Hardin (1996) supports developing protocols for lab tests in order to prevent the "overuse and inappropriate use of the laboratory" (p. 282). The protocols also enable DEM physicians to draw the specimens for which consultants usually ask upon their arrival. This better communication between providers can result in faster TATs for lab samples. Of 615 Labs sampled in 1993, over 70 percent reported they routinely consulted with DEM physicians (Steindel & Howanitz, 1997). Overall, these Labs improved their

services since a similar study in 1990. Another study (Ramoska, 1998), refers to “information sharing” as a way to decrease lab orders and costs without sacrificing quality care. Researchers monitored physician practice patterns, and reviewed their observations with individual providers. Within one year, the physicians under study reduced the number of specimens ordered per patient by nearly 18 percent (Ramoska, 1998). These results suggest some physicians may practice in a vacuum, unaware of the consequences of their actions. Ramoska recommends including physicians in participative decision-making to change wasteful behavior. Conversely, Steindel and Howanitz endorse the continual monitoring of TATs to provide feedback to the Lab on its performance. Regardless, a CQI process can improve the relationship between a Lab and DEM, and possibly decrease the amount of time patients stay in the DEM. Researchers can also apply the CQI approach to admissions processes.

Depending on location, DEM physicians may or may not have admitting privileges. Naturally, as Bazarian, Schneider, Newman, and Chodosh reported (1996), waiting for physician consultation delays admissions. As DEM admissions approach 40 percent of all admissions nationwide (Bazarian et al., 1996), streamlining the process is becoming increasingly important. Busier DEMs simply do not have the capacity to hold patients waiting for admission. At Strong Memorial Hospital in Rochester, NY, DEM physicians can admit patients without waiting for another physician’s assessment (Bazarian et al., 1996). This practice, coupled with an added short-stay unit for patients under observation, significantly reduced the time treat-and-release patients spent in Strong’s DEM.

The few consultants interviewed claim their response times are beyond their control. For instance, when the DEM staff pages a consultant, he or she might already have another procedure that demands no interruption. Still, Hirshon, Kirsch, Mysko, and Kelen (1996) observed that some physicians responded more favorably to some cases than others, depending on their preferences, comfort level, and patient acuity. The researchers noticed physicians' partiality, and implemented a rotating DEM schedule from which the providers could not deviate. The schedule's design prevented the physicians from avoiding particularly difficult or routine cases. In less than two months, the intervention significantly reduced the waiting and treatment times for patients presenting to the DEM. A one-year follow-on analysis of data produced the same results, refuting any claim that the clinicians worked more efficiently simply because they were being watched (the Hawthorne effect).

Lau and Leung (1997) did not ignore the fact that "the more efficiently a medical officer works, the more patients he or she has to see" (p. 299). Some physicians might avoid such a reward system that requires an employee to work harder for having worked more efficiently. The researchers caution that the time a physician takes to respond to a call may reflect how seriously that physician takes his or her responsibility. Therefore, they recommend managing consultant workload to prevent exhaustion and apathy and, subsequently, decrease waiting times. Unlike the Hirshon et al. study (1996), Lau and Leung (1997) assigned teams rather than individuals to patients, and produced similar results. Emergency department lengths of stay fell significantly by over 13 minutes.

Once treated, patients continue to occupy treatment rooms. The treatment rooms become, in a way, extensions of the waiting room. The DEM cannot treat other patients

until the rooms are empty. Clearing the rooms depends on how quickly the wards can admit a patient. Simon, McLario, Daily, Lanese, Castillo, & Wright (1996) attributed the lags in patient waiting times to, in part, the registration and admissions process.

Similarly, Bazarian et al. (1996) believe “admitted patients waiting in the [DEM] for an inpatient bed may be an unappreciated contributor to the often-prolonged throughput interval for...treat-and-release patients” (p. 1113). The authors attributed this delay to full beds on the wards. Bazarian et al. (1996) corrected the problem by adding more space and staff, to rid the ED of “boarders” (p. 1113) that occupied treatment space. Many DEMs do not have that luxury, and must search for other avenues through which they can accelerate patient visits. Lau and Leung (1997) would argue that reducing admissions entirely would eliminate delays. In Hong Kong, DEM physicians have admissions privileges, and are therefore able to reduce admissions. Their more intimate experience with acute patients enables them to make tougher medical decisions, which often result in more aggressive outpatient care. By “managing their patients without admission” (Lau & Leung, 1997, p. 302), they can remove this obstacle to throughput.

Like the admissions process, waiting for radiologists to interpret X-rays adds to the time a patient must wait in a treatment room. A project team in Saint Paul’s Hospital in Vancouver, Canada, identified “delays in X-rays” (Fernandes & Christenson, 1995, p. 848) as a contributor to slow throughput during its quality improvement (QI) campaign. As a result, the team members included an X-ray technician (tech) in each of its meetings. Though the team eventually decided to leave the radiology and Lab services unchanged, the average wait for patients requiring X-ray or Lab work fell from 108 to 82 minutes, after the QI initiative.

Specialists in many Departments of Radiology (DOR) reserve the right to read all films for patients seen during regular business hours before returning the results to the DEM. Saab, Stuart, Randall, and Southworth (1997) argue that “while this is a safe practice, to check all X-ray reports...is very time consuming in a busy department” (p. 215). The benefits of this practice are questionable. Saab et al. cite one study (Vincent et al., 1988) that reported senior British DEM physicians missed approximately 39 percent of clinically important abnormalities” (p. 215). Lufkin, Smith, Matticks, and Brunette (1998), however, claim “the standard practice of radiologists’ review of all [DEM] radiographs may not be justifiable” (p. 202). In their research, they found DEM physicians significantly misread only 11 (0.1%) of 9,599 films.

No research specifically addresses whether or not there is a significant difference in patient waiting times when DEM physicians interpret X-rays in lieu of radiologists. Certainly, since ordering X-rays can add as many as 42 minutes to a patient’s visit (Meislin, Coates, Cyr, and Valenzuela, 1988), waiting for a radiologist’s interpretation would also hinder throughput.

While many DEMs focus on improving peripheral services, reducing treatment variations inside the DEM is equally important to a thorough process improvement crusade. Similar to Lab protocols, clinical pathways streamline a patient’s visit by decreasing repetition and unneeded procedures. They are most commonly used for high volume, high cost, and high risk cases. Two of the more popular pathways in emergency medicine are for the treatment of acute chest pain and asthma.

Using a Total Quality Improvement (TQI) approach, Tilley, Lyden, Brott, Lu, & Levine (1997) discovered that managing variability in the treatment of acute ischemic

stroke reduced the time between a person's presentation to the DEM and treatment. Tilley's team identified five process variables within a DEM that required minimal resources for improvement. Most of the improvements were administrative, such as allowing DEM physicians to call a neurologist without first contacting a consultant. Still, the TQI initiative saved 5 to 15 minutes between each patient presenting to the DEM and receiving treatment.

Graham et al. (1997) developed clinical pathways in an urban DEM to "facilitate rapid determination of whether or not it is safe to discharge" (p. 8) a patient suffering from acute chest pain. Though Graham's study did not measure the pathways' effect on throughput, his research argues they can reduce the rates of admission. As physicians become more comfortable with pathways, they not only admit fewer patients, but become more confident discharging stable patients sooner. One might propose that accelerated discharges open treatment rooms, and, therefore, speed patient throughput.

Saint Joseph's Hospital staff in Orange County, California did speed patient throughput in its DEM after implementing clinical algorithms for asthma. The lengths of stay for similar patients fell from 180 to 94 minutes between two six-month periods (Bridgeman, Flores, Rosenbluth, and Pierog, 1997). The hospital standardized the clinical algorithms, but allowed physicians to vary treatments according to the individual. Still, less than 10 percent of completed algorithms strayed from the automated flow sheets. Saint Joseph's success now relies on decreased variation. However, caregivers are told "algorithms are guidelines, not standards of care" (Bridgeman et al., 1997, p. 324). Such flexibility might easily be portable to other Departments of Emergency Medicine.

Two of the least flexible variables available to DEM managers are space and labor. Many authors have cited the benefits of implementing Fast Track (FT) services (Ellis and Brandt, 1997; Meislin et al., 1988; Simon et al., 1996), which require both additional treatment areas and persons to staff them. Fast Tracks, or Acute Minor Illness Clinics (AMICs), treat those patients whom DEM triage personnel have coded “non-urgent”. Rather than hold non-urgent patients in a DEM, prolonging others’ waits, DEM caregivers transfer them to the FT. By reducing the numbers of inappropriate consultations in the DEM, managers are able to speed throughput for more urgent cases. Ellis and Brandt (1997) found 30 percent (75) of hospitals surveyed use FT services. Many installed the programs to meet access to care standards, improve customer satisfaction, and “attract or retain” (p. 232) market share in the non-urgent population. The Meislin, Coates, Cyr, and Valenzuela (1988) interventions reduced the time patients spent in a DEM by up to 50 percent for specific illnesses. Simon et al. (1996) noted one pediatric FT department enabled its DEM to maintain steady throughput times over a two-year period, despite a 55 percent increase in visits.

In 1994, the number of DEM visits fell 1.9% (2.1 million) from 1993 (Grayson, 1996, p. 14). However, an accompanying reduction in the number of inpatient beds nationwide has kept DEMs relatively crowded. As a result, many hospitals have expanded their observation and holding areas to clear DEM treatment rooms for more urgent cases. The Medical Center of Ocean County, Brick, New Jersey added four holding beds to a 14 bed emergency department to serve 25,000 annual visitors. Kent County Memorial Hospital in Warwick, Rhode Island now has 44 beds (up from 32) for 60,000 patients (Zimmerman, 1996). These hospitals now average approximately one bed for 1,800 visits

after renovations allocated separate holding and observation areas to their DEMs. As previously mentioned, patients waiting or held in a DEM bed for treatment or admission contribute to delays in throughput. Zimmerman (1996) claims both physicians and nurses support expanded observation units as means to release “needed treatment beds in a timely fashion” (p. 310).

Additional rooms, of course, require additional staff. However, a DEM might benefit from more staff, regardless of the space available. Fernandes et al. (1996) identified the addition of clerks, nurses, and unit coordinators as possible solutions to DEM delays. However, Bazarian et al. (1996) and Lau & Leung (1997) cited cases in which DEMs improved patient waiting times and throughput without significant changes in labor and staffing. Surprisingly, Chan, Reilly, and Salluzo (1997) found additional staffing “would have no effect on throughput and would have served only to increase cost” (p. 184). Due to the frequent and unexpected turnover of active duty and civilian staff in a military DEM, most military leaders might argue that “the more staff available, the better”, especially if it is already funded (R. G. Dickinson, personal communication, May 10, 1999).

Nurses are the primary persons responsible for discharging and educating patients in most DEMs. It is their hope that specific discharge instructions and self-care protocols will not only improve outcomes, but reduce the inappropriate use of the emergency room in the future. Gill & Riley (1996) suggest that patients seek care at DEMs simply because they do not understand the difference between urgent and non-urgent conditions. As many as 55 percent of DEM visits are for non-urgent illnesses (p. 491). The authors propose educating patients on the severity of illness and self-care might decrease the

number of unnecessary visits to the DEM. One study (Brewer & Jackson, 1997) actually identified a savings of \$20,000 from employing an on-site, DEM case manager. The case manager's goal was to "avoid admitting patients who, if properly supported, could be better cared for at home" (p. 1). Substituting self and home care for inappropriate admissions yielded the savings. Burnett & Grover (1996) also support patient education, but caution caregivers to educate each other. In their study, these authors found that 81 of 200 (40.5%) patients surveyed had been referred to the DEM by healthcare professionals. Regardless of this finding, few caregivers would reason that more education would have a negative effect on patient throughput.

A 10-year retrospective study in National University Hospital's Emergency Department (Singapore) revealed complaints concerning long waiting times outnumbered all others by approximately 11 percent (Ooi, 1997). However, Doctor Ooi included "long waiting times" in a broader category labeled "Patient Flow/Logistics." This category accounted for only 19.7 percent of all complaints. A category labeled "Doctor/Staff – Patient Relationship" accounted for most of the complaints (36.7%). Ooi concluded that an empathetic and caring staff, though one of the patients' most important expectations, is often the most difficult to control. Ooi cites another article (Bursch, Beezy, & Shaw, 1993) in which physicians' and nurses' caring and communication did influence patient satisfaction; "The total time patients actually spent in the [DEM] was found to be less important than receiving some immediate attention and caring service" (1997, p. 106). Ooi recommends aesthetically improving the waiting room and appointing patient liaisons to make visitors feel more comfortable.

In 1993, the Bergen Mercy Medical Center in Omaha, Nebraska, reconfigured its DEM to meet patients' perceptions and needs. The staff stowed wheelchairs and crash carts away from public view, and replaced them with potted plants and dimming lights. Nurses displayed their names in each treatment room, and wrote the type and purpose of each test for their patients to review. Kevin Schwedhelm, head of emergency services at Bergen, comments "What's surprising is that simple things make such a difference to people" (Lumsdon, 1996, p. 43). Following simple administrative improvements, Bergen added televisions and VCRs to many exam rooms. Patients may also take advantage of free coffee and a small kitchen near the waiting room. The DEM staff stocked the waiting room with self-help manuals and a touch-screen computer terminal to educate patients on health promotion. Though the entire DEM remodeling cost \$1.3 million, Carol Wahl, a nursing executive at Bergen, argues tying satisfaction to renovation is wrong. Rather, "a table and chairs in the right place can make a big difference to patients" (p. 46). Even before Bergen completed the remodeling, patient complaints fell from a total of 37 in 1994 to only two in 1995. Wahl is likely correct.

Managing perception is a formidable obstacle to improving patients' satisfaction with waiting times. In one retrospective study, only 22.3 percent of respondents accurately remembered physician waiting time (PWT) (Thompson, Yarnold, Adams, and Spacone, 1996). Not surprisingly, most (49.9%) overestimated how long they waited in the DEM. Thompson et al. (1996) warn patients "are not very accurate in their estimation of actual waiting times" (p. 652), and may, therefore, harbor unsubstantiated dissatisfaction. The researchers explored the psychology of waiting, citing Maister's principles of patients' perceptions: "unoccupied time feels longer than occupied times, anxiety makes waits

seem longer, uncertain waits seem longer than known finite waits, solo waits feel longer than group waits, [and] ... preprocess waits feel longer than in-process waits" (p. 655). Perceived waiting times may also increase the longer it takes to field a survey. Therefore, patient satisfaction surveys and process improvements that focus solely on waiting times might not always hit the mark; improving actual waiting times while ignoring patients' perceptions is fighting an uphill battle.

In a related article, Thompson et al. state patient satisfaction is the "sum of met and unmet expectations" (Thompson et al., 1996, p. 658). The authors found that perceived waiting times that were less than expected waiting times significantly improved overall satisfaction for a DEM visit. Actual waiting times, however, did not predict patient satisfaction. Similar to the approach used at Bergen Medical Center, Thompson et al. recommend appealing to patients' perceptions and expectations while improving measurable processes in order to earn customer satisfaction.

Appealing to perceptions and expectations does not require extensive renovations or financial obligations. Rather, many changes are purely administrative. Staff education and sensitivity training can affect customer satisfaction and are gaining popularity. Mayer, Cates, Mastorovich, and Royalty (1998) researched the effects of formal customer service education on patient satisfaction in a 62,000 visit/year level I trauma center. All DEM staff (over 200 caregivers) attended a four to eight-hour, clinician-led, training program. New employees attended the training within four months of their arrival. Within 12 months, without a significant change in patient visits or acuity, patient compliments increased 104 percent, while patient complaints fell 76 percent. "Complaints about perceived rudeness, insensitivity, or lack of compassion on the part of

[DEM] staff dropped most dramatically” (p. 431). Conversely, the patients’ compliments focused on the caregivers’ warmth, compassion, and skill. Without any additional medical skills training, the customer service education influenced the patients’ perception of how well physicians did their job. Similarly, though the DEM made no changes to throughput or billing, complaints regarding those areas decreased significantly by 50 percent. The authors concluded and propose that “clinically based customer training for [DEM] staff can decrease patient complaints and increase patient satisfaction in a large volume, high-acuity [DEM], and that satisfaction is independent of patient turnaround times” (p. 435).

By removing the obstacles to throughput, DEM managers can decrease waiting times. In turn, a brochure from the Institute for Healthcare Improvement (1998) contends that reducing delays can “affect” patient satisfaction. As stated in the PAT charter, the WACH DEM and this research intend to establish an “efficient and effective process to triage and treat patients presenting to the DEM which creates patient satisfaction.”

PURPOSE

Many variables affect how long a patient waits in the DEM. The PAT identified the variables with which the DEM most often grapples: the lab, admissions, consultant (on-call, admitting physician) response time, and radiology. The PAT examined other clinical and labor-related variables, such as treatment space and staffing, that also affect waiting times and are daily concerns for DEM managers. The DEM staff does not widely use clinical pathways or standard orders, but initiated a few during the course of this study. Similarly, self-care protocols and standardized discharge instructions can reduce the time nurses spend with patients, but these procedures are relatively new to WACH.

The purpose of the study is to discover those ways in which the WACH DEM can significantly improve patient flow and, subsequently, patient satisfaction. The objective of the study is to review the relationships between the DEM and its supporting services, monitor the actions and recommendations of the DEM PAT, uncover "best practices" in the industry, and quantitatively determine the success or failure of over six months of process improvement.

Hypothesis: Through a formal PI campaign, which results in positive physical, administrative, or process changes between the DEM and its supporting services, it is possible to significantly reduce the time patients wait to be seen by a physician and, hopefully, increase patient satisfaction.

METHOD AND PROCEDURES

The research includes both qualitative and quantitative measures to reach a conclusion. It examines how the WACH DEM functions, and recommends change based on industry practices and the results of personal site-visits in other facilities. The quantitative part of the project will determine, statistically, whether or not the DEM can reduce the waiting times through process improvement. Using graphic demonstrations, the analysis shows whether or not patient satisfaction improves over time.

Data collection in the DEM came exclusively from the Emergency Care and Treatment Record (Standard Form [SF] 558), the record of a patient's visit to the DEM. Records for approximately 2400 patients triaged as category I, II, or III (the charter's focus) between February 1998 and January 1999 provided equal and statistically powerful samples ($n = 1200$) for the six months before and after the PAT's start in August 1998.

The DEM staff files SF 558s by date, and each month has a drawer. For example, the “February 1998” drawer has 28 separate files – one for each day in the month. For each month, the research required a selection of 200 records. Approximately 8 to 12 daily files (depending on the number of daily visits), removed in no particular order by simply reaching into the cabinet and grabbing them, yielded 200 monthly records. This “random” draw was not scientific (for example, there was no random number generator), but did prevent any one file from being drawn twice.

On the SF 558s were entries for “time signed in” (computer generated) and “time seen by a physician” (manually generated). The difference (in minutes) between these two times was entered, in monthly columns, into Statistical Package for the Social Sciences (SPSS) version 8.0. Additional columns labeled “Before,” “After,” “Combined,” and “Type” grouped samples together in order to compare means through analyses of variance (ANOVA). The “Combined” column contained all 2,400 samples, and represented the dependent variable. Under “Combined,” one could not distinguish whether or not an entry came from the “Before” or “After” column. Therefore, it was absolutely critical that 1,200 “After” entries followed 1,200 “Before” entries. The “Type” column (representing the independent variable) contained only binary data – “0” for “Before” and “1” for “After”. There were 1200 zeros followed by 1200 ones in this column (the zeros and “Before” entries were in the same rows, etc). For the One-way ANOVA test, “Combined” was the independent variable, and “Type” was the factor. Analysis of variance determined whether or not category I, II, and III patients were seen more quickly after the PAT’s implementation of changes than before.

In a similar fashion, ANOVA also compared 1,040 DEM lab samples collected from the DEM in July 1998 to another 741 collected in January 1999. Patient satisfaction information generated for the DEM by the OASD (HA) and the Patient Representative Officer (PRO) demonstrated whether or not an upward trend exists in patient satisfaction along the same 12-month period.

The research monitors the evolution and maturation of the PAT, the obstacles it identifies, and the solutions it recommends and implements. Due to the nature of the data sources, the statistical analyses will not attribute (correlate) any change in throughput to a specific intervention; rather, the results will only indicate whether or not a change occurred.

The project addresses three types of validity: construct, internal, and external. According to Yin (1989), construct validity requires two steps. First, select the variables under review. Second, justify the unit of measure for these variables. Patient wait times and satisfaction are the variables under review. The SF 558s are the sole record for tracking wait times in the DEM. The Patient Representative and the OASD (HA) surveys monitor patient satisfaction. Though the OASD (HA) delivers its results three months after any given month, these two offices still provide the “convergent lines of inquiry” (Yin, 1989, p. 42) that support the construct validity. Internal validity refers to whether or not improvements in wait times or satisfaction have anything to do (statistically) with the changes the PAT implements. Some improvement might be the result of pure chance. For example, rather than an addition to staff making a difference, some unmeasured variable could be responsible for an outcome. Therefore, it is absolutely critical that the WACH PAT considers all players in the DEM process. Using Yin’s logic, an extensive

literature review supports the internal validity -- the variables the PAT uncovered are similar to those found in other DEM research efforts.

Based on the portability of others' research, this case study's external validity is strong. For example, other authors (Tilley et al., 1997; Goldberg, Chan, Haley, Harmata-Booth, and Bass, 1998) tout the benefits of implementing protocols, regardless of location. Since WACH is a rural military community hospital, the changes here might not apply to other DEMs. However, variables such as adding space or increasing the skill level of DEM employees are changes from which all hospitals can inarguably benefit.

The case study data collection is reliable. There is only one way to measure how long patients wait in the DEM to be seen by a physician. As Yin (1989) recommends, the data collection can easily pass an audit (p. 45). There will be no difference in the process between the two periods. While the data collection process is reliable, the data can suffer from human error. The section of the SF 558 that requires a physician's manual time entry is sometimes left blank, and the differences between one physician's watch (or lack, thereof) and another's limit accuracy. The research ignored those SF 558s categorized as level I, II, or III on which physicians entered no time, or one that was obviously incorrect (i.e., the time seen by a physician was earlier than the time of presentation). The remaining SF 558s are still reliable in that they all offer the only measure for "time seen" available to the research.

Ideally, this project would examine the long-term effect the PAT might have on patient satisfaction; for obvious reasons, the time frame is limited. Still, the analyses could show the immediate effects of the PAT's initiatives.

A preliminary analysis of data yielded the results in Tables 2 and 3:

Table 2

Descriptive Statistics for thePreliminary Analysis

Waits ^a	Mean (min)	Standard Deviation
Before	61.1	46.8
After	58.4	43.7

^an = 45 for each group

Table 3

Analysis of Variance for Waits Before and After the PAT

	df	Mean Square	F	Significance (p value)*
Between Groups	1	160.0	0.1	0.8
Within Groups	88	2050.0		

* $\alpha = .05$

Table 2 demonstrates that examining the mean time to be seen by a physician is the central theme of the PAT. As indicated by the significance of 0.8, there was statistically no difference between these two samples' mean waiting times. Similarly, the F statistic of 0.1 falls well beyond the test ratio of .006. Finally, though the preliminary samples of 45 were too small to draw a conclusion, increasing the sample sizes to 2,400 will likely change the figures above.

EXPECTED FINDINGS AND UTILITY OF RESULTS

The research expects to find some degree of change in patient throughput. At the very least, the project will uncover best practices in the DEM, and recommend ways to improve current operations. The results of the research will not only try to present statistical evidence that the changes in the DEM were effective, but also make the command aware of what changes it might want to consider in the future. Since the vision

of the PAT is to make patient flow in the DEM the prototypical patient-management process for the entire Army, the command should consider and implement any changes that are operationally and financially beneficial.

THE PROCESS ACTION TEAM

The Process Action Team (PAT) first met on August 5, 1998. The Chair of the PAT was the Head Nurse (HN) of the DEM. Participants included representatives from the DEM, Inpatient Wards, Outpatient Clinics, and Laboratory Services. As needed, the Chair invited persons from other services, such as the Red Cross and Admissions and Dispositions, to address specific issues. The PAT met regularly for the seven months preceding this study, no less than one hour every other week. The PAT recorder documented specific problem areas and the ongoing efforts to address them. Each member of the PAT assumed responsibility for one or more corrective actions; therefore, no single effort could “fall through the cracks.” Table 4 outlines the obstacles to patient throughput in the WACH DEM according to the PAT members’ observations and consensus. Included in the table are the interventions the PAT initiated to overcome those obstacles.

Table 4

The Obstacles to Throughput and Associated Interventions

<u>Obstacles</u>	<u>Interventions</u>
Lab TATs	The Lab installed a box solely for DEM drop-offs.
	DEM clerks and medics lobbied order/entry authorization to input and retrieve Lab and X-ray orders and results.
	When possible, the DEM used Red Cross Volunteers and clerical staff to deliver Lab samples.
Consultant Response Time	The DEM began tracking response time in August 1998.
	The DCCS briefed the department chiefs and consultants on the importance of swift response times.
Admissions	The A&D staff now carry pagers.
Critical Pathways	The DEM implemented a critical pathway for Asthmatics.
Patient Education	The DEM staff created and implemented self-care protocols for those patients presenting to the DEM with non-urgent, self-treatable conditions.
DEM Rooms	No action taken.
Radiology TATs	No action taken.
Staffing	The DEM gained an average of 2.07 Full Time Equivalents during the six months following the first PAT meeting.
Discharge Instructions	Nurses, rather than DEM physicians, began administering all discharge instructions.

THE DEM PROCESS BEFORE THE PAT'S INTERVENTIONS

Patients presenting to the DEM arrive through one of two entrances. Most of the DEM visits present to the registration clerk via the ambulatory doorway. The most urgent cases (traumas, cardiac arrests, etc.) by-pass the triage and registration areas for immediate care in one of the treatment rooms. The general process, however, is as follows:

Patients first present to the registration clerk. The clerk records the patient's major complaint, the mode of transportation, and any changes to allergies or demographic data. The automated SF 558, which includes the patient's demographic data as stored in the Composite Health Care System (CHCS), the MHS's automated patient tracking and order/entry system, becomes the treatment record. The clerk passes the SF 558 to the

triage nurse and asks the patient to wait until called. The triage nurse triages the patient according to time of presentation and severity of the complaint. However, the clerks do have a list of “red flag” complaints. When a patient presents with one of these complaints, the clerk immediately notifies the triage nurse. The triage nurse, in turn, interviews the patient immediately to determine whether or not the patient requires emergent care. Once triaged, the nurse has the following options: schedule an appointment with a primary care or Acute Minor Illness Clinic (AMIC, otherwise known as a Fast Track) provider, administer self-care protocols, or send the patient back to the waiting room to wait for the treatment nurse. When ready (based on acuity and room availability), the treatment nurse calls the patient to occupy one of the treatment rooms. The treatment nurse does have the option to treat the patient, if able to do so. If not, the patient will wait for the next available physician. The physician, after examination and treatment, will either release the patient or hold the patient for a consultant’s evaluation. If the physician decides to discharge the patient, either the physician or nurse will provide the discharge instructions. If the physician decides to call a consultant, the patient will wait in the same treatment room for the consultant to arrive, examine the patient, and make a final decision. Once the consultant makes the decision to admit, the DEM transfers the patient to the appropriate ward.

Some patients require ancillary services during their stay in the DEM. Part of the physician’s treatment plan might include an x-ray or lab test. Waiting for these test results obviously extends a patient’s visit. This “downtime,” accompanied by the wait for an admission (consultant response time, admissions personnel, completing registration paperwork), continually threatens swift patient throughput. Since the DEM staff is not

able to turn-over a treatment room during this time, waiting times increase; thus, more patients enter the DEM than are treated and released in a given period. This phenomenon is similar to waiting for a table in a busy restaurant. Simply adding staff (or waiters) will not speed throughput if the patrons are not ready to leave. It is no wonder, then, that Chan, Reilly, and Salluzo (1997) found additional staff had no effect on patient throughput.

THE NATURE OF THE OBSTACLES TO THROUGHPUT AT THE WACH DEM

LABORATORY TURN AROUND TIMES (TATs)

The relationship between the WACH DEM and Lab is indeed special. The WACH Lab processes more samples for the DEM than for any other service (88,561 in fiscal year 1998, followed by 47,115 from the Family Practice Clinic). Lab TATs are likely the most common obstacles to patient throughput in the literature review and were extremely important to the DEM PAT; therefore, the Lab representative was one of the more active participants. Before discussing the Lab's role in improving the DEM process, it is necessary to "follow" a lab sample's path from the DEM to the Lab, and back.

Physicians and nurses order lab tests via CHCS, using the automated order/entry templates. A Licensed Practical Nurse (LPN), medic (the military equivalent of a civilian patient care technician), or RN may draw blood for lab samples. Registered Nurses are able to draw blood and order lab tests without a physician's order, based on standing orders. Once drawn, the DEM staff manually labels the sample with the patient's demographic information, and transports it (the staff will often collect several samples before doing so) to the Lab's drop-off desk in a leak-proof plastic bag. The individual delivering the sample must sign a drop-off log, identifying the nature of the test, where it

came from, what time it was drawn and delivered, who delivered it, and whether or not the sample was ordered in CHCS.

Laboratory technicians do not staff the drop-off area, but check it often; it is in full-view from most areas within the department. Once a technician retrieves the sample, he or she carries it to one of the stations (Chemistry, Hematology, or Urinalysis) for processing. Before testing a sample, a technician must first “assess” (pull-up) the order from CHCS. As the technician does this, CHCS automatically prints a bar code for the sample that contains an automated order number and the patient’s name. The technician affixes the bar code to the sample (the manual label is also there), and places it in one of several analyzers for testing. As the analyzers test each sample, they pass the results (via bar-code recognition) to CHCS. The Lab technician must review and electronically initial each result before releasing it (within CHCS) to the provider. Of course, there are a number of factors that can slow this process.

It is not uncommon for a physician to order a lab test, a nurse to draw the sample, a medic to deliver it, and a Lab technician to retrieve it, without anyone having input the order into CHCS. When this happens, the process stops completely. Though technicians can create an order that should have been entered elsewhere, supervisors caution them not to; color-coded test tubes, though they should, do not always indicate what test the DEM needs. Instead, the technicians immediately call the responsible clinic (including the DEM) to have its staff order the appropriate test. Often, samples still go unordered after the first, and several follow-up phone calls (K. J. Paulson, personal communication, August 1998). Obviously, many slow TATs occur because clinics do not order these tests correctly or in a timely manner.

Mandatory quality checks (QCs) also contribute to slow TATs in the Lab. Regardless of a clinic's demand, certain analyzers require daily maintenance after a specific number of hours of continual use, or numbers of samples processed. This downtime (which can exceed 20 minutes), likely contributes to some backlog in processing, though the Lab alternates the use of its two chemistry analyzers. Similarly, many technicians prefer to test like-samples in bulk, rather than processing them one at a time, as they arrive (K. J. Paulson, personal communication, August, 1998). This practice creates downtime and, though convenient for the Lab, inconveniences the provider and patient; still, as human nature dictates, it continues when left unchecked.

Until recently, there was no way for the Lab to visually discern which samples were STAT versus routine. STAT samples require immediate testing, whereas providers might not need routine results for hours. As a result, it was possible for technicians to mistakenly identify DEM samples (all of which are STAT) as routine, delaying their priority. In September 1998, the Lab placed a STAT tray on the drop-off table; technicians know to look for and process samples in that tray first. Of course, less-disciplined technicians, regardless of the STAT tray's placement, might ignore all samples completely. This research cannot quantify employee indifference, but admits it can contribute to slow TATs in the Lab.

Finally, simple demand contributes to slow lab TATs. Depending on the analyzer, general chemistry tests run from as little as 14 to as many as 40 minutes. Without bulking like-tests, like-samples must wait for the ones that precede them. As they collect in the drop-off area, TATs increase.

In the last two years, prior to the creation of WACH's energized PI campaign and the DEM PAT, the Lab initiated two interventions in an effort to better serve its customers and decrease TATs. The first intervention required printed orders to accompany the samples as they arrived in the Lab. A printed order served as evidence that a clinic had made the entry into CHCS. The Lab abandoned this requirement after several weeks since compliance was so low that it showed no signs of possible improvement (J. A. Demchok, personal communication, August, 1998). The second intervention similarly tried to discipline providers to order tests. The Lab offered to call a clinic only once to remind it about an unordered test. After that one phone call, ordering the test became the clinic's responsibility. If, after eight hours, the sample still sat without an order, it was discarded. Again, lacking popular support, this initiative was abandoned before it started (J. A. Demchok, personal communication, August, 1998). Both efforts to decrease the number of unordered specimens arriving in the Lab did place an added burden on the clinics, but eliminated waste and several time-consuming phone calls.

In addition to the STAT tray now in the Lab, the DEM initiated two programs to help decrease lab TATs. This first program was an unprecedented lobby to grant medics and clerks order/entry authorizations. Nowhere in the hospital do these employees have this ability. The Deputy Commander for Nursing (DCN) and DCCS approved the plan, and training began in early November 1998. However, the course instructor voiced her reservations with giving non-licensed providers such autonomy. Specifically, she was concerned that medics and clerks might order incorrect tests or tests without physicians' orders. The Chief of the Department of Radiology (DOR) was similarly concerned that medics and clerks, once comfortable with physicians' practice patterns, might order

ancillary tests while patients wait for a licensed provider. To do so without an order is not only illegal, but potentially wasteful. For these reasons, the course instructor sent a memorandum to the Deputy Commanders for Nursing (DCN) and Administration (DCA) through her supervisor (Chief, Information Management Division). Training immediately stopped, and is under further review.

Lastly, the DEM employs Red Cross volunteers to shuttle blood samples to the Lab. Though the Lab is less than 70 paces from the DEM, the time it takes to deliver a sample and return is approximately two minutes. Done 30 times per day, this equates to approximately 60 minutes spent walking. Since the DEM is always open, couriers could spend as many as 21,900 minutes (365 hours / nine work weeks) walking to and from the lab. Clinically, it makes more sense that non-providers have this responsibility. Unfortunately, volunteers' schedules are hardly predictable; the DEM has little choice but allow nurses and medics to transport the samples.

Since the Lab and its customers are continually concerned with TATs, the Lab conducted a time study to compare TAT averages before and after the PAT. Statistical analyses (ANOVA) yielded the results in Table 5 at $\alpha = .05$.

Table 5

A Comparison Between Lab TATs Before and After the PAT

	July 1998 (Before)	January 1999 (After)	Significance (p value)
Chemistry	44.5 (n = 333)	42.8 (n = 194)	.6
Hematology	35.5 (n = 363)	35.6 (n = 237)	1.0
Urinalysis	35.2 (n = 344)	30.9 (n = 310)	0.1

Note. All TATs in minutes. Sample size (n) follows the average TAT.

CONSULTANT RESPONSE TIME

The DEM PAT first considered Consultant Response Time (CRT) a significant obstacle to throughput. However, as the PAT continued to mature, the DEM staff became increasingly satisfied with CRT. As a result, there was no major intervention to improve it. After several PAT meetings, the HN of the DEM found Medical Activity (MEDDAC) Memo 40-7, distributed on 1 June 1998, titled “Response Time for On-Call Health Care Providers”. Approved by the DCCS, this memo requires on-call physicians to “be present at the place of treatment within 30 minutes [of notification], when needed to deliver direct patient care.” Surprisingly, neither the DEM HN nor the Family Practice (FP) consultant on the PAT had ever seen or heard of the memo. Prior to this “discovery”, the PAT assumed one hour was a reasonable response time, but considered recommending 45 minutes. Not surprisingly, the PAT recommended no changes to the memo.

Reducing CRTs is difficult, since it is a function of ambiguous circumstances. According to one consultant from Internal Medicine (IM), simple preoccupation with other patients prevents a quick response (C. M. Metz, personal communication, August 6, 1998). This consultant admits that if a physician is busy, and the electronic page from the DEM is not urgent, he or she might not even have the time to return the page. “Not everything from the DEM is an emergency,” according to the consultant. Therefore, CRTs to the DEM vary according to patients’ acuity elsewhere.

The PAT still considered CRT important. Therefore, it asked the DCCS to brief his department chiefs and consultants on the importance of swift responses. Additionally, the DEM staff began tracking CRT on the patient’s SF 558 in mid-August 1998. The

Hawthorne Effect is probably partly responsible for any decrease in CRT; consulting physicians were not “blind” to the fact that they were being monitored.

THE ADMISSIONS PROCESS

Winn Army Community Hospital is fortunate since demand for inpatient rooms seldom meets or exceeds supply. As a result, the unavailability of rooms as an obstacle to patient throughput in the DEM is hardly an issue. However, the PAT did recognize that the admissions process is sometimes slower than desired. As a result, the PAT members discussed ways to make it faster.

Once a DEM physician determines a patient might need admission, he or she calls a consultant. Physicians in the DEM do not have admitting privileges. If the consultant decides to admit the patient, he or she calls the admissions office. The DEM patient may occupy a treatment room until the admissions person arrives and completes the registration process. Once the process is complete, the patient then moves to the appropriate ward. However, the consultant usually does not wait for the admissions clerk to complete the registration before moving the patient to the wards. This practice undoubtedly saves time. Like consultants, admissions clerks are not always able to respond immediately. Prior to the PAT, admissions personnel would respond quickly only if they were near their phone and able to answer it. The PAT realized this caused delays in admissions, and lobbied for the clerks to carry pagers. This intervention allows the DEM and consultants to notify admissions in a more timely manner. According to the DEM HN, admissions is no longer an obstacle to throughput.

CRITICAL PATHWAYS

As the literature suggests, critical pathways can reduce variation and save time. The military has not yet thoroughly embraced pathways, but there is a growing effort to use them. The Surgeon General of the United States Army, Lieutenant General Ronald Blanck wrote in August, 1998:

...we still have a huge variation in our practices - even with well developed and well used clinical pathways. There may be standardization within one facility but not across the system, and it is not necessarily evidence-based. I believe one of the major ways we will become the system we envision is to move to evidence-based practice guidelines. Many are already available, and can be adapted for our system. The key is to have agreed-upon guidelines consistently used throughout the Military Health System (MHS) with buy-in by the three Services and, where there is overlap, by the Department of Veterans Affairs (DVA). Single guidelines, even with local modifications, will insure the highest quality and most cost-effective care. The MEDCOM staff along with the Center for Health Care Studies (CHES) in the AMEDD Center and School have met with consultants, the other Services and the DVA, and are in the process of identifying which guidelines to develop/adapt as well as how to implement them. To help with the implementation process, we have contracted with Rand Corporation. Practice guidelines should be routine and easy to use. We cannot afford to just distribute them with no thought on how they should be melded into the ways we practice. Our forms,

information systems, training, and so on must all be integrated with the guidelines so their use is natural and as seamless as possible (Blanck, 1998).

The HN and Chief of the WACH DEM created a practice guideline for asthmatics in February 1999 (M. M. Ruest, personal communication, February, 1999). As is the case in many healthcare facilities, guidelines are relatively new to the WACH DEM.

Historically, the DEM staff did not consider them to be high priorities. Given the fact that the HN started a triage system only 18 months ago, last winter was an appropriate time to implement yet another aggressive change in patient treatment.

The HN echoes The Surgeon General's praise for guidelines. He expects the asthmatic guidelines will eliminate guesswork for the nursing staff. By the time a physician sees a patient, the treatment nurse will have most likely ordered the necessary tests for a given disease process. Allowing nurses to make more autonomous decisions will hopefully expedite treatment, reducing the chance that a patient's condition deteriorates in the waiting room.

The HN stresses that any guideline must be flexible in order to meet a particular patient's needs. At times, the HN admits, the guidelines can be wasteful if they prescribe a level of care beyond what is appropriate. Therefore, using an evidence-based approach to implementation is important.

PATIENT EDUCATION

Patient education is important for at least two reasons. First, teaching patients to better care for themselves and follow physicians' directions may result in better outcomes. Second, educating patients on the appropriate use of the DEM (ideally, before

the visit), a form of demand-management, allows healthcare providers to align resources with customer needs (M. M. Ruest, personal communication, September 7, 1998). For example, if education yields a decline in the misuse of the DEM, emergency physicians can readily administer emergency treatment for truly urgent patients. Often, it is possible for the DEM staff to achieve both education objectives during a single visit.

Once medically screened at WACH, a patient may choose to follow self-care protocols. If the triage nurse agrees that self-care is appropriate, he or she will provide the patient with excerpts from the book “Take Care of Yourself,” distributed by TRICARE Service Center Staff. The DEM maintains specific portions of the guide for the most common non-urgent ailments. Self-care protocols, when appropriate, yield better outcomes from several perspectives. First, the protocols help patients care for themselves at home. Choosing self-care not only shortens a patient’s visit to the DEM, but other patients’ visits as well by eliminating non-urgent visits; self-care yields faster turnover. Second, since self-care ideally prevents return visits to the DEM for routine ailments with which patients are comfortable treating themselves, it potentially saves costs for the hospital.

Discharge instructions are similar to self-care protocols in that they teach patients how to care for themselves after treatment. Physicians traditionally administered all discharge instructions to patients released from the WACH DEM. This practice obviously consumed time that physicians could have spent treating other patients. As the PAT matured, nurses began to share this responsibility. As of December 1998, nurses administered all discharge instructions. The HN of the DEM expects the exclusive

responsibility for discharge instructions will provide a sense of ownership and autonomy among his nursing staff.

According to a medical record review completed in September 1998, approximately 82 percent of patients treated and released from the DEM acknowledged receipt of discharge instructions by signing the treatment record. The HN believes this number will increase as his nurses become more comfortable with and standardize the process.

The DEM nursing staff is the front line for patient education. In addition to administering self-care protocols, the triage nurse explains the most appropriate ways to access primary care; he or she can register patients and recommend enrollment in TRICARE Prime. According to the Health Care Advisory Board (1996), uninsured patients present to the DEM since they know “that they will receive treatment” (p. 5). Similarly, United States Government Accounting Office (GAO) Report B-251319, published in 1993, cited “lack of a primary care provider” as a reason for non-urgent use of an emergency department (p. 5). Enrolling family members into TRICARE Prime, or at least registering them into CHCS, allows patients to access the primary care appointment system that need not rely on the DEM.

The WACH DEM treats approximately 120 patients per day. Peaks sometimes exceed 140, and troughs rarely fall below 90. According to the HN of the DEM, approximately 70 percent of the visits to the DEM are for non-urgent care. Up to 40 percent of all daily visits are pediatric. Clearly, the DEM offers a service that it had not originally intended. Non-urgent patients present to the DEM for a variety of reasons: unavailability of routine appointments in the outpatient clinics, convenience, and the inability to discern between emergent and routine conditions. However, there is an

additional reason that receives little press within WACH, but certainly exists. According to the Chief, Department of Primary Care, some clinics have sent patients to the DEM when they were unable to care for them within their own clinics.

Primary Care physicians might refer their patients to the DEM when demand or circumstance exceeds a clinic's ability to serve a given population (T. P. Garrigan, personal communication, May 10, 1999). For instance, the Obstetric (OB) Service assumes most primary care for women throughout their pregnancy. Women are told to report to OB sick call, on a walk-in basis, between 7:30 a.m. and 11:00 a.m. After 11:00 a.m., women greater than 20 weeks pregnant report to the Labor and Delivery (L & D) Ward to be seen by the on-call OB physician. Women less than 20 weeks must present to the DEM. According to the Chief of the DEM, this is unfortunate for throughput, but entirely appropriate. The OB and DEM physicians agree that any fetus younger than 20 weeks is non-viable. Therefore, an OB provider is likely no more able to medically manage a spontaneous abortion than a DEM provider. Still, it is entirely possible that the patient, once triaged in the DEM, requires specialty consultation. If urgent, the DEM staff will notify the on-call L & D physician, who may elect to see the patient that night or the following morning (Ochoa, personal communication, May 12, 1999). If the patient is not urgent, the DEM will screen her, and ask that she follow-up in the OB Clinic during regular sick-call hours. This scenario, though accepted by the DEM and OB staff, adds to the number of non-urgent patients presenting at the DEM and, likely, the time patients wait to be seen by a physician.

Improving access at WACH is a priority, but unforeseen circumstances sometimes compound the difficulties associated with meeting demand. On November 10, 1998,

mandatory annual training and unusually high demand overwhelmed some clinics.

Unfortunately, patient appointments had already been scheduled. In an effort to maintain access, the Family Practice, Pediatric, Obstetric, and Tuttle Clinic Chiefs asked the DEM staff to assist them. The number of patients presenting to the DEM exceeded 145 visits. Waiting times for categories I, II, and III were also higher, averaging 57.3 minutes to see a physician (during the PAT, waiting times fell to 51.3 minutes).

AVAILABLE DEM ROOMS

Space is one of the least flexible variables available to the DEM's managers.

Compared to other level II DEMs in the United States, WACH lacks treatment and holding areas. The Medical Center of Ocean County, Brick, New Jersey has 14 beds for 25,000 annual visits. Kent County Memorial Hospital in Warwick, Rhode Island has 32 beds for 60,000 visits (Zimmerman, 1996). A Level I facility such as Memorial Medical Center (MMC) in Savannah, Georgia, has 23 beds to treat 42,000 visitors annually (MMC admits 17 percent of its visitors). Dwight D. Eisenhower Army Medical Center (DDEAMC) in Fort Gordon, Georgia, has 23 beds to care for approximately 40,000 annual visitors (DDEAMC is a level I facility, but admits only seven percent of its patients). These hospitals average approximately one bed for 1,800 visits. Emory University Hospitals in Atlanta, Georgia have a combined total of 31 level I and II beds for 51,000 yearly visits (up to 27 percent of patients are admitted), or an average of one bed for less than 1700 visits. The ratio in the WACH DEM is one bed for 2,860 visits.

Limited space prevents physicians from treating more than one patient simultaneously, and obviously increases patient throughput times. Unfortunately, WACH's DEM managers can do little to alleviate the problem. The surgical clinic has

offered its patient rooms for after-hours use, but they are not well equipped for emergency uses. Therefore, space, as an independent variable, has had no effect on improving patient waiting times.

RADIOLOGY TURN AROUND TIMES

Like lab TATs, the DEM PAT cited radiology TATs as obstacles to throughput. Specialists in the Department of Radiology (DOR) reserve the right to read all films for patients seen in the DEM between 7:00 a.m. and 4:00 p.m. before returning the results to the DEM physicians. At other times, and on all weekends and holidays, DEM physicians read and interpret their own films. Some WACH DEM physicians argue that this adds unnecessary time to a patient's wait, and creates two standards of care. They reason, "if our interpretations are good enough while radiologists are not in the office, why can't they be good enough all the time?" The Chief of the DOR contends his staff's professional readings and interpretations add no more than 15 minutes to a patient's wait. A patient's and physician's certainty and piece of mind, he offers, are worth this minimal delay. Indeed, the Chief of the DEM agrees; though radiology can delay throughput, he is pleased with the department. His staff has never monitored X-ray TATs, but he estimates most films and interpretations return within 20 minutes. The facility standard is 30 minutes.

The PAT spent very little time examining the relationship between the DOR and DEM. Though radiology can add time to a patient's visit, films are often returned to the DEM while the physician is still treating the patient, or waiting on lab results. Also, the DEM staff orders films for less than 40 percent of its patients (70 percent require lab tests). Based on these facts and the comments from the Chief of the DEM, the PAT

determined X-ray TATs were not significant obstacles to throughput, and therefore recommended no changes to the current process.

SHORT STAFFING

The WACH DEM would likely benefit from more staff, regardless of space available. Its staffing levels are hardly static, since military orders cause unexpected and frequent turnover of both military and civilian personnel in most MTFs. Therefore, to compensate for high turnover rates, most military leaders prefer larger staffs (R. G. Dickinson, personal communication, May 10, 1999). In the private healthcare sector, managers must weigh the benefits of added staff against the increase in labor expense. In WACH, where labor expenses also carry significant impact, reorganizing a fixed military nursing staff to better serve the DEM carries little or no financial burden, though it can impact efficiency (matching resources to demand in the appropriate services).

Table 6 outlines the number of full time equivalent (FTE) staff members the WACH DEM has employed since February 1997. Abbreviations are as follows: GMO (General Medical Officer), PA (Physician's Assistant), LPN (Licensed Practical Nurse), <E4 (Junior Medic), >E4 (Medical Sergeant), G/L (Gains/Losses). Military medics and medical sergeants perform duties similar to civilian patient care technicians.

Table 6

Military and Civilian FTEs

	FEB	MAR	APR	MAY	JUN	JUL	AUG	SPT	OCT	NOV	DEC	JAN
Emergency MD	2	2	1	1	1	2	3	3	3	3	3	3
G/L	0/0	1/1	0/1	0/0	0/0	1/0	1/0	0/0	0/0	0/0	0/0	0/0
GMO	2	1	3	3	2	1	1	2	2	3	3	3
G/L	0/0	0/0	1/2	1/1	0/1	0/1	0/0	1/0	0/0	1/0	0/0	0/0
Contract MD	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	2.9	2.9	2.9	2.9
G/L	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Physician Asst.	0	0	0	0	1	1	1	1	1	1	1	1
G/L	0/0	0/0	0/0	0/0	1/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Emergency PA	1	1	0	0	0	0	0	1	1	0	1	1
G/L	0/0	1/1	1/0	0/0	0/0	0/0	0/0	1/0	0/0	0/0	0/0	0/0
Registered Nurse	9	10	9	9	9	9	10	9	10	10	10	10
G/L	1/0	2/1	0/1	1/1	0/0	0/0	1/0	0/1	1/0	0/0	1/1	0/0
LPN	3	3	3	3	3	3	3	2	1	1	1	1
G/L	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/1	0/1	0/0	0/0	0/0
MEDIC < E4	8	6	7	9	6	8	5	5	5	5	6	5
G/L	0/0	0/2	1/0	2/0	1/4	2/0	0/3	0/0	0/0	0/0	1/0	0/1
MEDIC > E4	9	8	8	9	10	10	11	11	11	11	11	11
G/L	4/0	0/1	0/0	1/0	1/0	0/0	1/0	0/0	0/0	2/2	0/0	1/1
CLERK	5	5	5	5	5	5	5	5	5	5	5	5
SECRETARY	0	0	0	1	1	1	1	1	1	1	1	1
TOTAL FTEs	43.3	40.3	42.3	46.3	44.3	46.3	46.3	46.3	44.9	44.9	46.9	45.9

It is important to consider the rows for Gains and Losses. The HN of the DEM requires new staff members to spend four to six weeks in department orientation before he considers them a bone-fide gain. For example, a nurse may report to the HN of the DEM in late June, but not count as a gain until August. Therefore, the DEM finds it difficult to quickly recover from moderate to heavy turnover in a single month.

There was an average of 45.9 FTEs per month in the latter half of the study, compared to only 43.8 FTEs in the first half. Whether or not staffing levels affected waiting times during the course of this study is unknown. Still, as Table 7 demonstrates, average waiting times fell 15.6 percent while the number of monthly visits and FTEs available increased by 9.3 and 4.8 percent, respectively.

Table 7

FTEs Compared to Patients Seen and Average Waiting Times

	Before the PAT	After the PAT	Percentage Change
Average Monthly FTEs	43.8	45.9	4.8
Average Monthly Visits	3186	3483	9.3
Average Monthly Waits	59.2	51.3	(15.6)

RESULTS

Tables 8 and 9 indicate that waiting times fell significantly during the study period [$p < .001$, $Z_{\text{computed}} (18.5) < Z_{\text{test}} (341.6)$]. The mean waiting time for all samples was 55.2 minutes, with a monthly peak of 65.8 (March 1998) and low of 44.1 (December 1998). Between periods, mean waiting times decreased by nearly 16 percent while the number of patients (all categories) treated in the DEM increased by almost 10 percent (19,121 in the control period compared to 20,903 in the study period). Sample size power analysis was strong (over 99 percent) and therefore helps substantiate the findings.

Table 8

Descriptive Statistics for the ActualAnalysis

Waits ^a	Mean (min)	Standard Deviation
Before	59.2	48.2
After	51.3	42.3

^an = 1200 for each group

Table 9

Analysis of Variance (Actual) for Waits Before and After the PAT

	df	Mean Square	F	Significance (p value)*
Between Groups	1	38017.0	18.5	.000
Within Groups	2398	2056.9		

* $\alpha = .05$

Even before the PAT's start, the average waiting time for patients triaged as categories I, II, or III was below WACH's goal of 60 minutes. Since the difference in waiting times was statistically significant, we might expect an increase in patient satisfaction (assuming the two are related and Jones (1996) and Ellis & Brandt (1997) are correct).

The WACH staff tracks patient satisfaction in the DEM using two methods. The first method is simple. The Patient Representative records all compliments and complaints for every department, including the DEM. A data base query for the six months before and after the PAT yielded the results displayed in Figure 1 for the DEM.

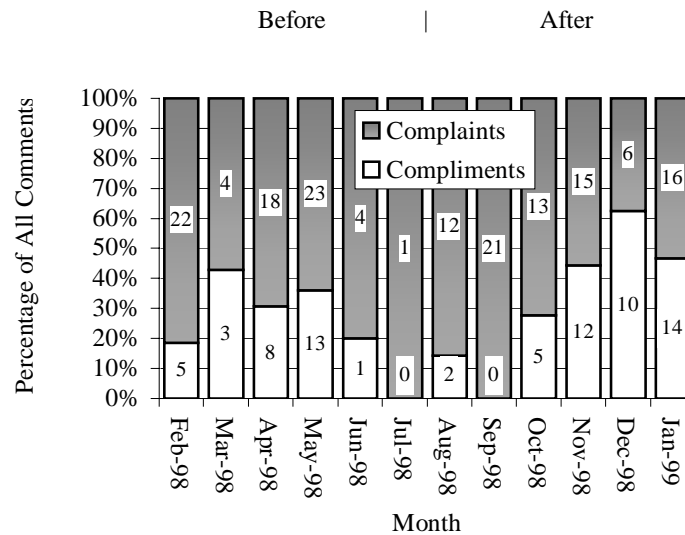


Figure 1. Patient Complaints versus Compliments displayed as a percentage of the total number of patient comments received for that month.

For the six months preceding the PAT (control period), the Patient Representative collected 102 comments about the DEM. Of those, 30 (29.4%), were favorable. For the six months following the PAT (study period), the Patient Representative collected 126 comments, of which 43 (34.1 %) were favorable. Using favorable comments as a percentage of total comments, the PAT appears to have improved customer satisfaction in general. The DEM treated 1,782 (9.3%) more patients in the study period, and still increased favorable comments by 4.6 percent.

One might argue that seasonality (Spring and Summer versus Fall and Winter) drives the percentage of compliments to comments. This study did not control for seasonality, yet tested for it. Analysis of variance revealed a significant difference ($p < .001$) between monthly averages. However, as Figure 2 demonstrates, the greatest difference is between the March and December averages – two winter months. The averages between April 1998 and January 1999 are relatively linear.

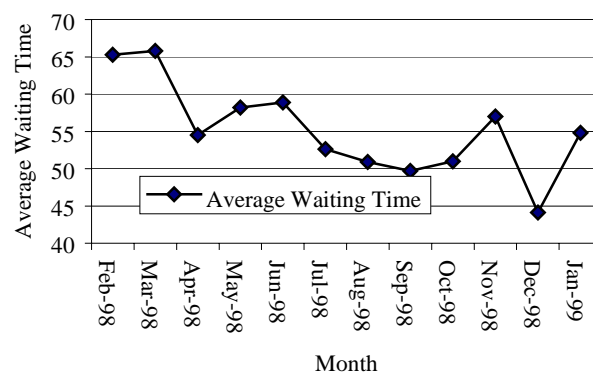


Figure 2. A linear representation of average monthly waiting times (in minutes).

Fifty-five (76.4%) of the 72 unfavorable comments collected between February and July 1998 mentioned prolonged waits (independent of triage category). After the PAT, only 50 (60.2%) of 83 unfavorable comments mentioned prolonged waits, a decline of 14 percent from the previous six months. Again, using unfavorable comments about waiting times as a percentage of unfavorable comments in general, the PAT increased patient satisfaction. National data suggest there are three to five complaints for every 1,000 DEM visits (Mayer, Cates, Mastorovich, and Royalty, 1998). The WACH Patient Representative collected an average of four per 1,000 (using 40,000 annual visits as the

denominator) in the six months prior to and after the PAT. Considering the national benchmark, the WACH DEM does relatively well, but can improve.

The other monitor for patient satisfaction is the monthly Customer Satisfaction Survey, conducted by the Office of the Assistant Secretary of Defense for Health Affairs (OASD [HA]). The survey is published monthly, but reflects data from the quarter ending three months earlier. For example, as of April 30, 1999 the latest surveys available to WACH include the quarterly results from the November 1998 to January 1999 period. Using Question 12, Overall Satisfaction with Clinics, Figure 3 displays the results of the last 19 surveys for the WACH DEM. A score of seven (completely satisfied) is better than a score of one (completely dissatisfied).

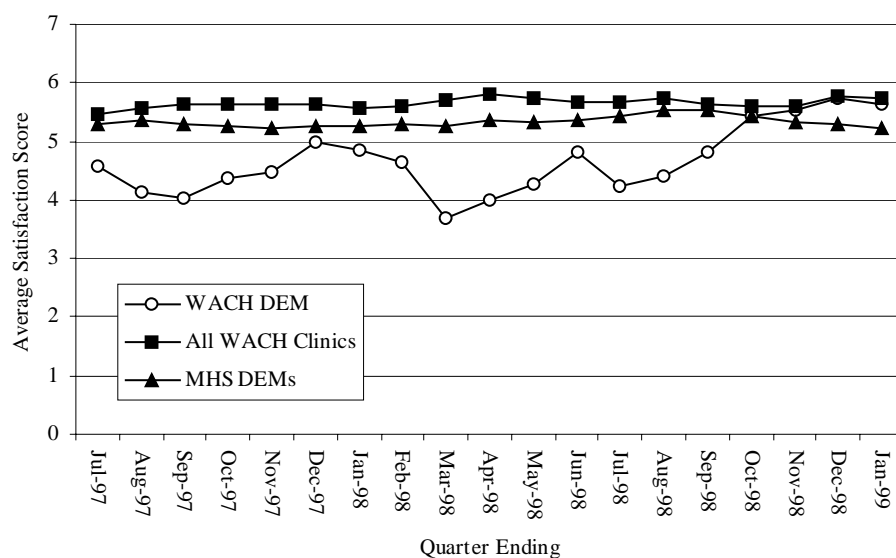


Figure 3. Overall Satisfaction with Clinics between July 1997 and January 1999.

The WACH DEM has consistently scored below other clinics within the MTF and other DEMs within the MHS. However, since the quarter ending March 1998, there has been a clear upward trend in satisfaction. It is interesting to note how steeply satisfaction

has increased in the DEM since the start of the PAT in August 1998. A casual glance at Figure 3 indicates patient satisfaction is still rising, but WACH needs several more surveys to determine whether or not the DEM can sustain its current performance.

DISCUSSION

The qualitative nature of the study does not allow one to draw a numerical correlation between any of the PAT's initiatives and patient waiting times. For example, it is difficult to say whether or not self-care protocols had as much effect on throughput as the heightened customer awareness of the staff. Similarly, there was no way to quantify the effect the Admissions staff telephonic pagers had on clearing treatment rooms more quickly. It is very likely, however, that the Commander's emphasis on customer satisfaction had something to do with how quickly and compassionately the providers served patients.

Another limitation of the study is the fact that the data did not discriminate between the time of day or day of week. Depending on the time of day or day of week, the DEM may or may not have more staff members on duty. The random selection of the SF 558s accounted for any gross errors. Similarly, the survey did not include all SF 558s triaged as categories I, II, or III. Physicians sometimes (approximately every tenth record) ignored the "Time Seen" block completely, rendering that SF 558 useless for data collection. Additionally, though its effect on the results is not certain, the study did not account for any seasonality in visits or customer comments.

Though data collection ceased on January 31, 1999, the PAT continues to meet. Some of the issues discussed above are not yet mature. For example, the critical pathways are so new that they have yet to have any effect on how physicians deliver care

in the DEM. The Surgeon General has tasked the Regional Medical Commands (operationally, the “regional headquarters” that are responsible for supporting and directing several subordinate MTFs located within a specific geographic area) to create, by consensus, at least 10 protocols that are applicable to subordinate MTFs. For this reason, it is very likely that WACH’s own asthmatic pathway will soon be obsolete. Certainly, since the DEM did not use the pathway until February 1999, it had no effect on patient throughput during the course of this study.

The PAT truly believed granting order/entry authorizations to clerks and medics would have a positive effect on waiting times. There has been no instruction since November 1998; therefore, not one clerk or medic has been able to input or retrieve orders. Like the critical pathways, this PAT initiative had no effect on the outcome of the study.

Self-care protocols, however, were more common during the last two months of the study than all the months previous. While searching for those SF 558s triaged as categories I, II, or III there was a noticeable increase in the number of non-urgent records that carried a slash across their midsection above which nurses wrote: “referred to self-care.” The exact number of records that carried this label is not available; therefore, it is difficult to statistically attribute any decrease in waiting times to an increase in referrals to self-care.

Anecdotal evidence suggests the relationship and communication between the Lab and the DEM improved over the life of the PAT. Still, unordered lab samples dominated the PAT’s discussions with the Lab’s representative. The HN and his staff continually reminded each other and the physicians to order tests appropriately, but there is no

evidence to suggest this increased awareness of the problem contributed to decreased TATs or patient waiting times. Several visits to the Lab indicated both Lab and DEM staff share the responsibility for slower TATs. Casual inspections with the Chemistry Sergeant revealed appropriately ordered samples sitting idle on the counter, in no particular queue. Similarly, the Lab technicians often removed the STAT tray for no apparent reason; more than once, the Chemistry Sergeant had to replace it after it was lost. Therefore, it is difficult to argue that the STAT tray, as a PAT intervention, had anything to do with decreased TATs or patient waiting times.

Treatment space and staffing plagued the DEM's operations late in the study. January 1999 exceeded 4,100 visits (a WACH record) with a one-day high of 181. A rejuvenated military directive requiring all emergency room physicians to carry licenses resulted in a loss of 1.5 civilian FTEs that same month (C. West, personal communication, May 1999). The DCCS directed active duty Family Practice and DEM physicians to cover the loss. The AMIC grew to two providers covering 3:00 p.m. to 11:00 p.m. on weekdays and 10:00 a.m. to 11:00 p.m. on weekends, with double coverage between 3:00 p.m. and 6:00 p.m. Still, the AMIC did not have a permanent "home;" providers continued to treat patients in borrowed space from other clinics. Regardless of its nomadic style, the AMIC likely contributed to faster throughput by removing patients from the DEM. The average waiting time for the most urgent patients presenting to the DEM in January 1999 did not exceed 55 minutes. Five other months (February, March, May, June, and November 1998) during the study and control periods had longer waits while serving smaller numbers.

Over 75 percent of patients presenting to the WACH DEM do not have urgent conditions. These patients are ideally suited for care in the AMIC. However, the AMIC only has two providers, who treat a total of approximately 40 to 50 patients per day – less than 50 percent of total DEM visits. The WACH leadership should try to align its workforce and resources to the population's demand by expanding the AMIC service.

Before the AMIC can expand, it must have a dedicated area from which to operate. After regular business hours, the AMIC staff often uses the surgery clinic. The HN of the DEM proposes moving several departments in the hospital to make room for a growing AMIC. The HN's proposal does not detrimentally displace any one service, and yields an additional six rooms for the AMIC. Six rooms (beds) added to the 14 on hand will decrease the DEM's ratio of beds-to-visits to one for 2,000 – a 30 percent increase in capacity.

The DEM personnel on hand and the pending RN and LPN hires will staff the AMIC. Current workload (40 to 50 per day) requires no additional providers. However, to properly arrange the staff to treat 75 percent of the DEM's patients, the HN proposes reassigning those General Medical Officers (GMOs) and PAs in the DEM to the AMIC. The HN of the DEM predicts that the overhead expenses of his proposal would be negligible. The present military staff and permanent clinic spaces are sunk costs, while the clinics have already identified eight exam tables as "excess", yet suitable for the AMIC's requirements.

The AMIC providers presently schedule 28 appointments per day. By expanding the AMIC's space, the HN of the DEM feels allotted provider-appointments can soar to 42 per day – an increase of 50 percent. For non-urgent conditions, space is more important

than staff. Referencing the restaurant example stated earlier (p. 28), one provider can easily care for two or three patients at once, while multiple providers have difficulty “moving” patients when there are no rooms in which to put them (this is presently the case in the WACH DEM). Therefore, expanding the AMIC space immediately, without an urgent concern for increased staffing, will undoubtedly speed throughput.

Given the number of complaints that refer to waiting times, the WACH staff should be able to improve customer satisfaction over time by concentrating on patient throughput. However, as the Patient Representative’s data indicates, patients are not only concerned with how long they wait. Similarly, the Health Affairs Survey also records patient satisfaction by measuring the perceived general quality of care received, independent of waits; faster throughput affects only a part of patient satisfaction. Therefore, the WACH DEM must also focus on other mediums through which they can increase customer satisfaction.

How well a staff treats patients while they wait (regardless of how long they wait) definitely affects satisfaction, yet is one of the more difficult behavioral variables to change in any clinic or service. Figure 4 uses data from the OASD (HA) survey to demonstrate the close association between access, interpersonal relationships, and perceived quality of care at WACH’s DEM. Those persons surveyed were able to rate the three variables on a scale of 1 (Poor) to 5 (Excellent). From this figure, one can argue that patients’ perceived quality of care is more a function of interpersonal relationships than of access. In fact, the Pearson correlation coefficient for Interpersonal Relationships compared to Quality is greater than that for Access compared to Quality (1.0 versus 0.8). However, both correlations are statistically significant ($p < .001$).

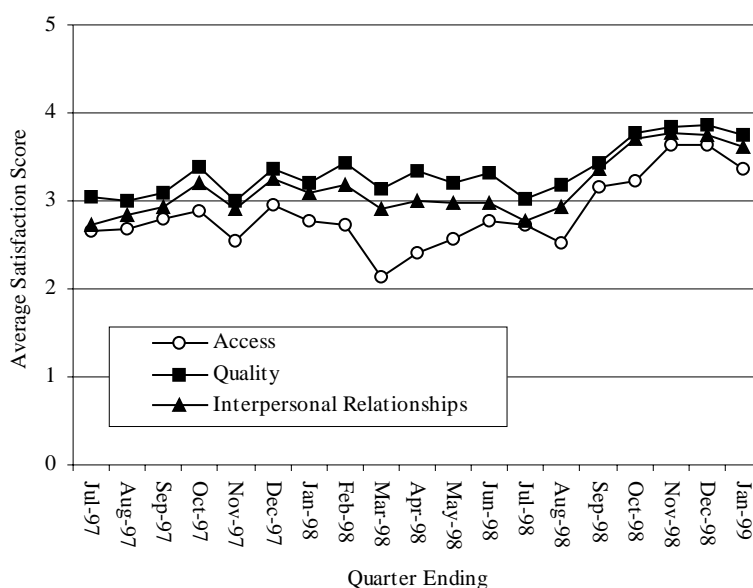


Figure 4. The association between perceived quality of care, access, and interpersonal relationships at WACH's DEM.

Treating patients as valued customers is a priority at WACH. Today, the hospital's leadership requires all persons to attend Total Quality Management (TQM) training. An example of the customer-focused culture espoused by the WACH staff is that all members now answer the phone by saying "Thank you for calling Winn Army Community Hospital..." Similarly, the command encourages employees to escort patients to their destination if they appear to be lost. However, the PRO still receives complaints that mention rude staff members and persons that appear indifferent. As recently as January 31, 1999 one patient complaint referred to an employee's bad attitude in the AMIC. Therefore, in the absence of all employees' total compliance with the tenets of TQM, the DEM, like most clinics, should continue to concentrate on improving

patients' perceptions with its service. The staff must continually ask itself, "How would I like to be treated, and am I facilitating that atmosphere right now for my patients?"

Regardless of the study's qualitative and anecdotal approach to interpreting the results, the DEM did, in fact, enjoy faster throughput and improved customer satisfaction over the life of the PAT. The WACH DEM is a level II trauma facility, yet has the census (based on visits elsewhere), standing operating procedures, and expertise expected in much larger facilities. Compared to other facilities covered in the research, the WACH DEM is hardly behind the power curve. In fact, besides space and staffing, one might argue the WACH DEM is a leader in its field.

Research included four on-site visits to other DEMs in Georgia: Memorial Medical Center (MMC), Savannah; Crawford Long (CLH) and Emory University Hospitals (EUH), Atlanta; and Dwight D. Eisenhower Army Medical Center (DDEAMC), Augusta. Tours of these facilities and interviews with their managers and employees indicate that the WACH DEM runs well compared to its civilian and military peers. In some cases, WACH is more impressive. There is also room for improvement in WACH's processes, though some recommendations would require additional funding to initiate. Still, it is interesting to compare and contrast how one facility operates versus another.

ANCILLARY SERVICES

The MMC DEM has two dedicated x-ray technicians and rarely sends patients to the Department of Radiology for routine films. The DEM physicians read all films, regardless of the time of day. Radiologists review the films within 24 hours, and report discrepancies back to the DEM physicians. The Strategic Business Unit (SBU) Secretary

tracks the discrepancies for Quality Assurance (QA) purposes. This program started in January 1998, and has reduced throughput times at the MMC DEM.

Improving radiology TATs was the focus of the only formal Process Improvement campaign in the MMC DEM in 1998. After only two meetings, the Medical Director decided the answer to the problem was simple: allow DEM physicians to read films, and base their treatment decisions on those interpretations. Who reserved the right to bill was the most difficult question to answer while making that clinical decision. Since billing does not apply to reading films at WACH, allowing DEM physicians to read more films should not be a difficult decision. Though the Chief of the DOR at WACH believes this practice is not necessary, doing so could very well increase throughput without sacrificing outcomes.

One of the major differences between the hospitals' Labs is MMC's ability to send samples through vacuum tubes. All Emory University DEMs do the same. Memorial lines the tubes with durable foam that prevents breakage. Additionally, MMC wraps the samples in sealed biohazard bags for protection and identification. Printed orders on orange paper must accompany every DEM sample, which immediately distinguishes those samples from other departments. Therefore, the MMC DEM seldom sends unordered lab samples. The WACH Lab initiated a similar requirement, but abandoned it after physicians refused to follow it. Printing orders that already exist in CHCS defeats the purpose of an automated system. However, neither the WACH Lab, DEM, nor PAT has been able to identify a different way to encourage physicians to always order tests appropriately.

Under a new order/entry system, MMC plans to reduce lab TATs by 30 minutes. The new software will allow nurses to print bar codes as they order the labs. This eliminates at least one step: the Lab technicians will no longer have to query the order entry system to retrieve the order number. Similarly, the Lab will no longer affix the bar codes. Since the DEM nursing staff will print out and affix their own bar codes, their own manual identification tags become obsolete, saving more time in the DEM. The new program will produce one label that contains both the patients' demographic information and the Lab's bar code. Unlike the WACH staff, all clerical persons have order/entry authorization. The Nurse Manager of the MMC DEM knows of only one case in which a staff member abused the system.

The WACH DEM meets or exceeds the standard when compared to the Crawford Long DEM. Only RNs may draw blood and deliver fluids at CLH, whereas military medics often do both. Clerks at Crawford Long, however, do have order/entry authorization. Surprisingly, CLH's DEM physicians almost never input their own orders. Still, registered nurses input no orders without a physician's written or verbal request. Winn's DEM RNs do have standing orders, and believe they save time by ordering those labs and x-rays with which they are familiar for a given complaint.

There are no identifying marks on the samples the CLH staff sends to the Lab. If samples arrived without orders to the STAT Lab (collocated with the DEM), the Lab technicians will remind the DEM staff to order them. The main Lab, located on the floor above, abandons all unordered samples without question. Since the CLH Lab and DEM have a similar relationship to WACH's, lab TATs are always a concern.

Radiologists at the Emory University DEM read all films, regardless of the time or day. Since the Department of Radiology is not part of the order/entry system and approximately 75 percent of all visitors require lab tests or x-rays, the DEM HN continually grapples with slow TATs. To improve this process, the EUH Lab Service plans to install an order/entry option for bar coding similar to the one at MMC (B. Bosselman, personal communication, December 16, 1998). However, ordering radiographs electronically lags behind. After following the automated and manual paths a physician's order must follow in each of the civilian facilities, it has become obvious that CHCS (the MHS's automated patient tracking and order/entry system) definitely surpasses most industry benchmarks.

Dwight D. Eisenhower Army Medical Center is a teaching institution; therefore, many younger students are not comfortable making tougher medical decisions without collecting as much information as possible on the patient (Flake, personal communication, January 26, 1999). As a result, a first-year resident will consult a second-year, and so on, until one finally makes a call to admit or discharge. Similarly, the students are more likely to order more ancillary services than experienced physicians (Flake). Still, the HN of the DEM notes no problems with TATs. Similarly, his staff infrequently sends unordered samples to the Lab. The DDEAMC has a dedicated x-ray room, and all DEM physicians are free to read their own films at any time of day, depending on their complexity. He attributes part of his good relationship with the ancillary staff to the fact that his medics and clerks all have order/entry privileges.

VISITS, ACUITY, AND ADMISSIONS

Operationally, Memorial Medical Center's (MMC) DEM differs more from the WACH DEM than other facilities. Memorial's DEM is the premier level I trauma facility in Savannah, Georgia. Surprisingly, both MMC and WACH treat the same number of patients per day (115 or more). However, MMC admits roughly 17 percent of its visitors, compared to only one or two percent at WACH (on January 20, 1999, the WACH DEM treated over 170 patients and admitted none). The difference in acuity likely stems primarily from the fact that WACH serves a much younger and healthier population.

Besides size and patient population, there are very few differences between the Emory University Hospital (EUH) and WACH DEMs. Though its census is relatively low for a level I trauma facility, the EUH DEM staff does admit 27 percent of its visitors. Therefore, many of the patients that wait for treatment do so in a bed. The EUH DEM has 14 beds to treat 50 patients per day. Engineers designed all rooms to accommodate any ailment, to include cardiac care and trauma. At WACH, a nurse could use any treatment area to deliver fluids, but room designs limit the number of beds that could accommodate cardiac and trauma patients.

The DDEAMC DEM treats approximately 40,000 patients annually (admitting no more than eight percent of its visitors), using 60 staff members and 22 beds in 21 rooms. Its census meets the industry average (based on the literature and site visits) of one bed for approximately 1,800 visits. Though the DDEAMC DEM does admit almost eight times the number of patients that WACH admits (not unusual for a medical center with a teaching mission), its patient population is relatively similar (Flake, personal

communication, January 26, 1999). Therefore, it is interesting to note that the DDEAMC DEM employs approximately 1.5 times the number of staff and space at WACH to treat similar numbers and types of patients.

PATIENT EDUCATION

All MMC DEM staff members carefully follow the Consolidated Omnibus Budget Reconciliation Act (COBRA) guidelines, which encourage patient choice and require all DEM visitors receive a medical screening. This safety practice adds some time to the physicians' rounds, but is limited to only a small number of visits per day (no more than 20), and limits liability under COBRA. Winn's DEM nurses administer self-care protocols, without physician supervision. Similarly, treatment nurses can actually treat and release patients. These practices, though timesaving, apply an interpretation of COBRA with which MMC would be uncomfortable. Technically, the WACH DEM is not bound by COBRA guidelines since it does not accept Medicare payments. If the TRICARE Senior Demonstration Project (which enrolls Medicare eligible beneficiaries as Prime members to the MTF) becomes a reality, military DEMs may become more acutely aware of COBRA regulations and be forced to abandon such practices as referral to self-care. The Health Care Financing Authority (HCFA) will reimburse MTFs for levels of effort that exceed the numbers of Medicare eligible beneficiaries they presently treat. When this happens, the MTF will accept Medicare payments. It is at this point where the boundaries between COBRA regulations and self-care will become more defined.

The MMC DEM practices demand management. Patients triaged as categories three or four visit with the Health Options Coordinator. This person counsels patients on the

appropriate use of the DEM. Also, he or she helps patients schedule appointments with a PCP. This system ensures patients “enroll” in a routine healthcare continuum. The aggressive referral and education system has significantly reduced the number of patients presenting to the MMC DEM (T. Woiwode, personal communication, October 26, 1998). As a result, the patients in the DEM are generally more acute. Therefore, though the numbers of patients have decreased, an increase in acuity has kept throughput times relatively stable. Nurses in the WACH DEM stress the appropriate way to access primary care to all patients. However, without penalties or easy access to the primary care clinics, some WACH nurses admit they are fighting an uphill battle.

The Crawford Long DEM can enroll patients to the Emory Healthcare System, but does not do it as well as it should, according to its Nurse Manager (M. Vazquez, personal communication, December 15, 1998). The staff usually treats and releases patients without considering them as future revenue sources. Similarly, the DEM does not have an aggressive patient education system that captures new beneficiaries, sets up appointments, and explains the proper way to access care. The WACH DEM not only refers patients to the appropriate place for care, but also refers patients to the Health Benefits Office to enroll in TRICARE Prime (when eligible). Approximately 10 to 15 persons present to the WACH DEM daily that are eligible for TRICARE Prime, but are not enrolled. The WACH DEM nurses distribute literature to these individuals and explain the benefits of enrollment.

The DDEAMC DEM staff does not educate non-urgent patients on the appropriate use of the DEM as aggressively as the personnel at WACH. The DEM staff is actually large enough to treat most visitors in the immediate area without making a primary care

appointment. Therefore, the HN has not found it necessary to start a fast track system or encourage the use of self-care protocols.

STAFFING

Memorial employs a larger staff to manage the higher acuity of its patients. Eighty-six persons (including administrative staff) monitor 23 rooms at MMC, versus almost half that amount (46 providers for 14 rooms) at WACH for the same number of visits. Staffing at the MMC DEM follows the troughs and peaks in daily visits. Overall, the number of visits versus time of day is predictable. Therefore, the DEM manager plans accordingly. Like WACH, MMC's busiest times are between 5 and 11 p.m. Eight nurses work during that time. If the WACH DEM HN scheduled as many nurses during its peak hours (WACH only employs a total of 12 nurses in the DEM), none would be left to work the following shift. Charge nurses at the MMC DEM do not hesitate to use clerical staff as chaperones for pelvic exams and other minor procedures. The HN of the WACH DEM does not use his administrative staff for that purpose because union rules prevent the widespread use of clerical staff for any duty outside of their job description. More importantly, he simply does not have the staff to support such a practice. Using a receptionist to chaperone a pelvic exam would often leave the registration desk unattended.

MANAGING PATIENT FLOW

The Exam RN at the MMC DEM is able to manage the patient flow by acuity and wait times. For example, if a higher category patient has been waiting an inordinate amount of time, the RN may opt to have that patient seen before a lower categorized patient, if medically possible (T. Woiwode, personal communication, October 26, 1998).

Though this is not an “advertised” practice at any DEM, it might be a good one to follow. It appeals to some patients’ perspective of “first come, first served”, and could help patient satisfaction. The HN of the WACH DEM encourages his nurses to manage patients by exception under similar circumstances, though physicians sometimes argue it creates a less-predictable patient flow.

Category IV (the lowest acuity at MMC) patients number fewer than twenty per day. Memorial’s staff refers these patients to one of four places: their Primary Care Provider (PCP), the county indigent care center, the after hours clinic, or the DEM itself. If non-urgent patients opt to stay in the DEM, they must pay a \$100 fee to do so. Currently, there are no such “nuisance fees” in the MHS; similarly TRICARE Prime members suffer no penalty for seeking non-urgent care in an MTF DEM.

There are no time standards at MMC from triage to physician treatment. To do so, according to the Nurse Manager, is legally dangerous. Therefore, the MMC DEM staff treats persons in order of acuity, when staffing and flow permit. The Nurse Manager’s concerns are not unique. George, Quattrone, and Goldstone (1996) warn “if we set arbitrary and sometimes constricted time limits during which we must accomplish certain care, we are really setting a trap for ourselves, one that we should avoid” (p. 339). The line between speeding-up patient throughput and decreasing quality outcomes is hardly clear. The PAT’s charter requires physicians lay hands on patients within one hour of presentation to the DEM. Quality of care is an assumed constant, and there is no indication that WACH’s efforts to increase patient satisfaction have sacrificed outcomes.

RECOMMENDATIONS AND CONCLUSIONS

The purpose of the research was to discover those ways in which the DEM could significantly improve customer satisfaction by improving throughput. By reviewing the relationships between the DEM and its supporting services, the PAT identified several variables that influenced how long a patient waits in the DEM. The PAT considered lab TATs, treatment space, and staffing the most significant obstacles to serving patients quickly. Also, the PAT discovered additions to current medical practice, such as self-care protocols, clinical pathways, and superior customer service may do as much for decreasing waiting times and increasing patient satisfaction in the future as adding rooms or providers.

The fact that waiting times for the most urgent patients averaged less than one hour before and after the PAT is a testament to how well the WACH DEM already operates. Certainly, past patient satisfaction surveys might indicate otherwise, but one fact remains -- the DEM exceeds the standards of the charter (and patient satisfaction is improving). Besides space and staffing, the DEMs reviewed in the literature and during on-site visits differ slightly. Similarly, the literature concerning throughput consistently mentions the same themes: Lab, Admissions, radiology, and TATs. It is not be surprising then, that the PAT identified the “low hanging fruit” very quickly. The PAT initiated no broad and sweeping changes. However, it did identify some broader issues that, if changed, could differentiate the DEM from many others. For instance, changing the way in which the DEM sends samples to the Lab and affixes bar codes, who reads and interprets x-rays, increasing staff and available AMIC rooms, and truly educating patients are aggressive interventions that the PAT was relatively powerless to initiate or finance.

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